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ABSTRACT

This document contains four papers that are answers to comprehensive examination questions of a doctoral student in instructional technology. The first paper, "Federal Support and Funding of School Library Media Programs into the 21st Century," includes sections on why federal support and funding are needed, how school library media programs (SLMPs) help K-12 students, and why school library media specialists (SLMSs) are needed. The World Wide Web (WWW) as a research tool is discussed in the next paper, including Internet tools, electronic data collection, e-mail discussion groups, electronic interviews, web-based surveys, and software tools Entitled "Using the WWW as a Research Tool for Collecting Data," this paper also describes use of the Internet to investigate the changing role of SLMSs in light of new technologies. "Technology and Learning: A Reaction Paper," the third paper, considers how two books--"The Children's Machine" (S. Papert) and "Knowledge as Design" (D.N. Perkins)--relate to current practices and attitudes about the use of technology in education. The final paper, "Focus on Selected Roles of School Library Media Specialists:," addresses the role of SLMSs; special skills and attributes of the instructional planning process; teaching, learning, and achievement; and collaboration with teachers. (Contains 122 references overall.) (MES)

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ED 416 906

Comprehensive Written Exams: Questions and Answers

June 1997

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Table of Contents

I. Dr. Melvin Bowie

Question:

"Janice, you have been asked to speak before a Joint-Appropriations Committee in Congress. You have been asked to justify the continued support and funding of school library media programs by Congress into the 21st century. Your speech is to be 40 minutes long. Outline the speech, including the main points you would like to make to the Congress. Write a rationale for each of the main components of the speech, explaining why you think it would be important to include a specific point."

Answer (paper):

"Federal Support and Funding of School Library Media Programs into 21st Century"

II. Dr. Michael Orey

Question:

"Review the recent literature on teacher attitudes and level of computer competence (since these seem to be related). Relate these findings to those reviewed by Dupagne and Krendl (1992) in their review. Generate a list of ways that attitudes might be changed (if this is where you want to head). This list might lay the groundwork for what your plan is in your dissertation?"

Answer (paper):

This paper was submitted to "Computers in the Schools" for publication.

III. Dr. Tom Reeves

Question:

"The World Wide Web (WWW) and other Internet tools have many applications in educational research. For example, scholars have begun to use the Internet as a tool for collecting data using a variety of survey techniques including both questionnaires and interviews. For your comprehensive exam, please review the state-of-the-art of using the Internet (or if you prefer a more narrow focus, the WWW) as a research tool for collecting data in the social sciences, especially education. In addition, describe a draft of the approach of how you will use the Internet in your investigation of the changing role of school library media specialists in the light of new technologies."

Answer (paper):

"Using the WWW as a Research Tool for Collecting Data"

IV. Dr. Lloyd Rieber

Question:

"Read Papert (The Children's Machine, 1993) and Perkins (Knowledge as Design, 1986) and consider how they relate to current practices and attitudes about the use of technology in education among teachers and media technologies. In your answer, consider the tension between what is currently possible with existing or available school technologies versus future scenarios. Your task is to identify what you feel to be the most important issues, and then develop and present a reaction/critique/ position based on well-formed and substantiated arguments. You are also free (and encouraged) to identify any other sources you wish. As we also discussed, I would like you to use an innovative format for presenting your answer: an originally developed web site supported by a brief paper (about 10 pages). The web site should be constructed so that it "stands alone," meaning that people who visit it should understand it even if they don't have access to (or don't choose to read) your paper."

Answer (paper): *"Technology and Learning: A Reaction Paper"*

[Comprehensive Exams URL: http://www.arches.uga.edu/~jvh/Jhardy/Comps.html]

V. Dr. Myra Womble

Question:

"You have been asked to serve as keynote speaker at an upcoming national professional meeting. The theme of your keynote presentation is "Strengthening Student Learning Through Information Technologies." You have been asked to focus on school library media specialists as information professionals and educators. In preparing your keynote presentation, you are asked to address four points:

- Point 1. What is the traditional view of the school library media specialist and how has technology changed the "traditional" view? What significant role must today's library media specialists play in providing information access, storage, and dissemination? Discuss the implications of knowing how to evaluate and use emerging information technologies. Discuss the implications of promoting information literacy among students.
- Point 2. Identify the special skills, attributes, and perspectives today's school library media specialist (elementary, middle, high school) brings to an instructional planning process (e.g., improve quality of resources, focus instruction on learner needs)?
- Point 3. Has the school library media specialist become more involved in teaching? If not, why? If so, how has increased involvement in teaching affected students' achievement and satisfaction with their learning? Does learning (e.g., exploratory, discovery, cooperative) depend on the school library media program? If so, how?
- Point 4. What are some of the models and/or strategies for promoting successful collaboration in planning, teaching, and evaluating by library media specialists and classroom teachers? What significant role does the school library media specialist play in providing instruction for students?

Also, from a visionary perspective, your conclusion should include implications for the role of school library media specialists as change agents in schools."

Answer (paper):

"Focus on Selected Roles of School Library Media Specialists: Information Professionals and Educators"

"Federal Support And Funding Of School Library Media Programs Into The 21st Century"

Speech Outline and Rationale

Comprehensive Examination Question

Dr. Melvin Bowie

Janice V. Hardy

Department of Instructional Technology

The University of Georgia

Table of Contents

I. Introduction 1

II. Why Federal Support and Funding Are Needed 1

III. How School Library Media Programs (SLMPs) Help K-12 Students 2

IV. Why School Library Media Specialists (SLMSs) Are Needed In K-12 Schools 4

V. Why School Library Media Programs Are Needed And Must Be Funded 4

VI. Conclusion 5

VII. References 8

Introduction

In 1993, the International Federation of Library Associations (IFLA) acknowledged that there is a general lack of awareness at all levels of the importance of libraries, and that adequate funding of school libraries is crucial to a country's national development (Galler, 1996). The IFLA made some noteworthy recommendations:

- encourage national education authorities to develop policies and introduce legislation on the role of school libraries in national development,
- improve financial support for school libraries and centralized support services for school libraries,
- encourage teacher-librarians and head teachers to become aware of the actual financial needs of their libraries, maximize the range of resources available, and seek ways to supplement their funding and budgets,
- recognize that the present state of school libraries is generally poor, and that there is a lack of support for school libraries among politicians, government officials, administrators, and teachers,
- emphasize the important contributions which school libraries can make to the social, educational, and economic development of a country. (p. 292).

America's children and youth require school library media resources and services to accomplish the systemic changes mandated by the Educate America Act, Goals 2000. However, the 1993/1994 survey of school libraries by the U.S. National Commission on Libraries and Information Science (NCLIS) and American Library Association (ALA) indicated that our country's elementary and secondary school libraries are not adequately and equitably meeting those objectives. School library improvement programs are needed to achieve excellence and equity for our country's students. The findings of the NCLIS survey should have a significant influence on any legislation defining the federal, state, and local governments' role in support of elementary and secondary education. Moreover, federal leadership, support, and assistance are essential to achieve the national objectives and high performance standards set by Goals 2000 (Simon, 1994).

Why Federal Support and Funding Are Needed

President Clinton and the Congress have asked for assurance from the Department of Education (DOE) that any increased funding for education would lead to achieving measurable goals -- goals which should enable all students to become technologically literate and develop essential communication, math, science and critical thinking skills needed in the 21st century (Henderson &

Costabile, 1997).

Schools are under increased pressure to achieve more with less. Some of the challenges schools face today are:

- serious resource limitations and cutbacks,
- soaring costs of classroom instruction,
- increasing demands for continuing education for a workplace where present job descriptions quickly become obsolete as new ones emerge, and
- more student diversity. (Price, 1996, p. 17)

Most school library media programs traditionally share the same economic fates of their schools' budgets. If funding is reduced, then the library media program may have to reduce essential services, acquire less materials, or cut personnel. Therefore, convincing fiscally conservative or strapped state legislatures, school boards, and parents, becomes an absolute necessity if our students are to prosper in an increasingly competitive global marketplace (Craver, 1995).

Although the federal role in funding school library media programs is limited, the resources from federal programs can be a significant boost in helping schools and school districts fill existing gaps and improve the overall quality of their school programs and professional development efforts (American Association of School Librarians, 1997).

How School Library Media Programs Help K-12 Students

Barbara Stripling's 1996 American Association of School Libraries (AASL) presidential theme of "Libraries Lead To Learning" is all the more important in the context of declining budgets and elimination of jobs. She points out that every school library media program should be:

- focused on individual student needs,
- framed around an understanding of how students learn and the requirements for active inquiry,
- integrated into the teaching and learning of the school,
- focused on developing a love of reading and learning,
- built around a solid curriculum of information literacy, taught in conjunction with content learning,
- developed collaboratively by everyone involved in the learning community of the school. (Stripling, 1996, p. 1)

School library media programs have a valuable and positive impact on student learning, and contribute to the overall performance goals of schools and school districts (Berkowitz, 1993). There is

empirical research to support a positive correlation between the level of library media center service available and student scholastic achievement (Haycock, 1995). For example, the research indicates:

1) In schools with a full-time library media specialist, and library media facilities and resources:
   - students perform significantly better on tests for basic research skills, including locational skills, outlining and notetaking,
   - students perform significantly better in reading comprehension and in effectively expressing their ideas about what they read,
   - students enjoyed reading,
   - students read more, and
   - students developed more positive self-concepts.

2) There was a positive correlation between student academic achievement and:
   - the size of the library media center staff,
   - the size of the library media collection, and
   - school library media center expenditures (budget). (p. 228)

Students today face many challenges as the 21st century approaches. School libraries and library media centers can have a powerful influence on learning and achievement, and are essential for all children from prekindergarten through high school. The school library media program can help meet the personal, recreational, informal and structured learning needs of our students. These needs include (Mathews, Flum, & Whitney, 1990):

- the belief in a worthwhile future and understanding of their responsibility and contribution to that future;
- a positive sense of self-worth;
- the ability to locate and use information and the awareness that this ability is an essential key to self-realization in the Information Age;
- preparation to use present-day technology and to adapt to a changing technological world;
- equal access to all information resources and opportunities to use a variety of information technologies that store, transmit, and retrieve information;
- the ability to think critically in order to problem solve and make informed decisions;
- the ability to communicate effectively by listening, speaking, writing, and reading;
- preparation to live in a multicultural world and to respect the rights and dignity of all people;

- the ability and desire to become lifelong learners; and
- a broader view of the world through imagination and creative ability. (p. 169-170)

Why School Library Media Specialist s Are Needed In K-12 Schools

Teachers need to know how to evaluate instructional materials, how to incorporate these materials into the curriculum, and how to use (operate) a variety of equipment. Teachers need in-service training opportunities to develop and refine their skills for creating, adapting, and utilizing rapidly changing technology. Furthermore, teachers need the expertise and support of a professional who understands the role of instructional technology in the teaching and learning process. In many schools, the necessary support for integration of technology into the curriculum is not available. Many teachers have no on-site instructional technology support to assist them with the design and development process of their instruction to incorporate technology. A full-time library media specialist is the type of instructional technology support staff teachers need to have available to them to successfully use and incorporate technology into their daily classroom activities (Zenor, 1995).

School library media specialists must make it clear to all stakeholders the profound impact that strong school library media programs staffed with professional personnel can have on student achievement. Our professional goals include active leadership roles, collaboration and participation in the teaching and learning process, connecting learners to information and new ideas, and preparing students for life-long learning, informed decision-making, use of information technologies, and an appreciation for all forms of literacy (Stripling, 1996).

Why School Library Media Programs Are Needed And Must be Funded

The school library media program (SLMP) functions as a vital instrument in the educational process, totally involved in the teaching and learning process (International Association of School Librarianship, 1993). Its goals can be expressed through the following functions:

- informational - SLMP provides access, retrieval and transfer to all types of information;
- educational - SLMP provides an atmosphere and environment for continuous education through its facilities and resources for lifelong learning;
- cultural - SLMP helps to improve students' quality of life through the support and presentation of aesthetic experiences, including art appreciation, encouraging creativity and exploration, developing positive relationships and interpersonal skills;
- recreational - SLMP supports and encourages well-rounded, enriched life experiences for students

through recreational and leisure time programs, information and materials on recreation and leisure skills, and guidance in the use of leisure time.

The existence and utilization of the school library media program is a vital part of our educational system. It is central to the fulfillment of the instructional goals and objectives of the school and promotes this through a planned program of acquisition and organization of information technology, and dissemination of materials to expand the learning environment of all students. The school library media program provides a wide range of resources, both print and non-print, including electronic media, and access to data which promotes an awareness of the student's own cultural heritage, and provides the basis for an understanding of the diversity of other cultures (International Association of School Librarianship, 1993).

Berkowitz (1993) identifies three critical reasons for justifying funding for school library media programs:

- students will be prepared and competent to enter the information age,
- students achieve at higher levels because there is a library media specialist in the school, and
- students achieve at higher levels because of a quality library media program. (p.3)

The establishment and funding of school library media programs can demonstrate to the public that our government officials and representatives are fulfilling their responsibilities to implement education which will enable all students to develop their individual potential and become productive, successful members of the global society. A strong school library media program with qualified school library media personnel is a major factor in creating a quality educational system. The society that invests in school library media programs for its schools invests in the future of its children (International Association of School Librarianship, 1993).

Conclusion

The Information Age, the future of the electronic frontier, is exhilarating and frightening, powerful and perplexing. The challenge of education has never been more exciting, and at times, seems overwhelming. Massive resources of information to keep up with, and rapid technological change, will force schools to look at the reality of how to manage and afford the programs that are so desperately needed for students to learn and teachers to teach. The school library media program is the one program that serves the total school and community, and in an information rich, technology dependent society it is a very valuable commodity to have. Therefore, it becomes every educator's

personal responsibility to study the implications of current local, state, and federal legislation that effects education, and to communicate to their community leaders and Congressional representatives their concerns and needs (Gonzalez, 1996; MacDonald, 1994).

School decision-makers must be aware of the critical need for access to instructional resources, especially to technology. Many parents have recognized the importance and, those who can, provide it at home. The tools of technology are seen as motivating, productive, and empowering. They allow students to access and create new realms of knowing and doing. However, there are not enough of these tools available in schools to all students when they want or need them. Many students are being denied access because technology is expensive (Gaines, Johnson, & King, 1996).

Inequities of class, gender, ethnicity and economic disparity correlate highly with denied or restricted access to technology and library media resources. When it comes to gaining greater access, many students are simply not going to have it. The funds and resources are just not there. Most schools don't have the necessary budgets or available funding to address the issues of adequate access or equity.

The impact of technology and the need for technological literacy will be pervasive in the next twenty years. Futurists tell us that the common link between most jobs of the future will be technology. It is predicted that approximately ninety percent of all jobs will be dependent on computers by the year 2010. Employers will come to expect new workers to demonstrate skills that are characterized as symbolic-analytical, focusing on analytical reasoning, logic, and communication. Productivity and economic gain will be linked to the effective uses of new technologies. In order for our students to be competitive and constructive in the work force, they will need to graduate from school with an expanded set of technical skills in communication, problem-solving and production (Craver, 1995; Gaines, Johnson, & King, 1996).

Never before have library media programs and the professional skills of library media specialists been so essential to educational institutions. If schools are to supply students with the skills, training, and knowledge they need to have to graduate and be productive citizens, the services and materials offered through the library media center become indispensable and imperative for teaching and learning (Craver, 1995).

It is especially important for school library media specialists to become more actively involved and outspoken in the proposal process for continued funding of our Nation's schools, particularly the

school library media and technology programs. It is crucial for school library media specialists to plan for the future, to know what is needed, and to explain these needs to school and public officials at the local, state, and national level (Henderson & Costabile, 1997).

School library media specialists must be the people who stay proactive and inform the stakeholders -- the Congress, state lawmakers, local voters, community leaders, business, school boards, administrators, teachers, parents and students -- that the school library media program, all of its resources and staff, are essential expenditures and must have continued funding (Gonzalez, 1996).

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Using The WWW As A Research Tool For Collecting Data

Comprehensive Examination Question

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Running Head: Using The WWW As A Research Tool

Table of Contents

I. Introduction 1

II. The WWW As A Research Tool 1

- Internet Tools
- Electronic Data Collection
- Email Discussion Groups
- Electronic Interviews
- Web-Based Surveys
- Software Tools

III. Issues of Concern 8

IV. Conclusion 9

V. References 11

VI. Appendix 13

- Part 2 of Comprehensive Exam Question: Describe a draft of the approach of how you will use the Internet in your investigation of the changing role of school library media specialists in the light of new technologies.

Introduction

The Internet, particularly the World Wide Web (WWW) , is a resource that is waiting to be tapped by researchers in more creative and qualitative ways. Currently, the WWW is being used as an information source, a search tool, and a medium for publication (Eklund and Eklund, 1996). The graphical interface, interactive capabilities, and the recent widespread incorporation of Java interactivity of the WWW should push the Internet into even greater research utilization and acceptance (Starr and Milheim, 1996). The World Wide Web is both a recent innovative technology and a tool through which a researcher's investigative and research skills may be applied across many domains.

The Internet has had phenomenal growth within the last five years. Over 35 million users around the world are connected, and approximated three million new accounts are added to the ever growing network each month (Wilson, Ryder, McCahan, and Sherry, 1996). For example, approximately 98% of the 1,899 public K-12 schools in the state of Georgia now have some type of access to the Internet (Quality Education Data, 1997).

People are valuable resources for information and collecting data, but conducting any research can be very expensive and time consuming, especially with large population samples. Educational researchers are finding alternative data collection methods to use to investigate research questions and to access a variety of artifacts, documents, information, and people simultaneously. The World Wide Web and other Internet tools such as electronic mail (e-mail), listservs, electronic discussion groups, and USENet newsgroups (electronic bulletin boards) are being used to access and obtain information from people in ways that are not restricted by distance, location, or time.

The WWW As A Research Tool

Internet Tools

There are several popular ways for communicating and obtaining information online (Laughon & Kurshan, 1996; Pool, Blanchard, & Hale, 1996; Starr & Milheim, 1996):

- bulletin boards, newsgroups, or distributed networks - email messages are posted and assembled into areas of interest, often called conferences, and is normally locally oriented;
- chat or chat rooms - real-time, on-line discussions with one or more persons;
- electronic mail (e-mail or email) - sending and receiving online mail which can be public (e.g.,

listserv, newsgroup) or private messages. Electronic mail has revolutionized communication by allowing users to transmit and receive information from virtually anyplace in the world with a computer node connected to an online service (Thach, 1995).

- listserv - an electronic mailing list you subscribe to become a member of the list and receive and transmit messages to other list members; managed by specialized computer software with messages distributed to every list member's mailbox, making this a convenient way to reach hundreds or thousands of people with one message (Ferri, personal communication, January 18, 1997), for example the Georgia Library Media Specialists Listserv or School Library Media Specialist Listserv (LM-NET, http://ericir.syr.edu/lm_net/).
- state or regional networks - a telecommunications system that is practically or fully operated and funded by a state agency or outside organizations to support instructional and administrative activities in K-12 schools in a state, and connects every school or school district in a state (e.g., TENET, the Texas Education Network, http://www.tenet.edu),
- commercial educational networks - developed to specifically provide moderated educational activities and curriculum projects (e.g., Scholastic Central, http://www.scholastic.com/)
- commercial networks - these networks provide educational conferences and forums as a part of their numerous features and services (e.g., America Online, http://www.aol.com/)
- World Wide Web - through the creation of homepages (web pages or web sites) a variety of projects and people are accessible to researchers and teachers (e.g., Global Schoolhouse, http://k12.cnidr.org/gsh/gshwelcome.html)

Electronic Data Collection

In Thach's (1995) review of the literature, she identified eleven key issues that relate to the design, implementation, and response to electronic data collection (email survey research): demographics, layout and presentation, user orientation and instruction, ease of editing and analysis, confidentiality, email invitation to participate, faster transmission, cost-saving, faster response rates, candid responses, and speed and magnitude of responses. (p. 28-30). There are four characteristics of electronic mail which makes it advantageous for survey research:

- speed - messages can be transmitted in seconds to anywhere in the world which could result in faster response rates;

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- asynchronous communication - messages can be sent, read, and replied to at the convenience of the user which allows the user time to think about his or her answers and respond when ready;
- no intermediaries - email messages are generally read by the receiver only, and increase the chance of the respondent receiving the survey immediately and responding;
- transitory - email messages are typically brief messages that can be saved and printed out later, or can easily be deleted with no trace of a hard copy. (Sproull, 1986; as cited in Thach, 1995, p. 27-28)

Although electronic mail has been used for survey research since the late 1970s, this particular application for it has not been widely discussed in the literature (Kiesler & Sproull, 1986; as cited in Thach, 1995). "Email survey research" is the systematic data collection of information on a specific topic using computer questionnaires delivered to an online sample or population (Thach, 1995, p. 27). Respondents receive, complete, and submit their completed questionnaires via electronic mail. With the growth of online networks and the number of people who are connected and have access to the WWW, it is conceivable that use of email survey research will increase.

Pool, Blanchard, and Hale (1996) used the Internet to conduct a survey and collect data on people's opinions of and experiences with the Internet. Four questions were asked:

- should computers be added to more classes?
- how is the Internet currently used?
- what benefits/aids does the Internet provide for teaching?
- what type of future does the Internet have in education? (p. 183)

The questions were emailed to various USENET newsgroups (e.g., k12.chat.teacher) that discussed the uses of computers, and specifically, the uses of the Internet within education. Forty-six responses were received from a wide variety of people including students, teachers, college professors, and business people from all over the world (e.g., Germany, India, California, and New York).

The Center for Technology in Education (CTE) conducted a national survey in 1992 of K-12 teachers' use of telecommunications to obtain information for two primary purposes (Bank Street College of Education, 1993):

- professional enhancement, and

- student learning (e.g., classroom exchange projects, communicating with colleagues, downloading curriculum materials, and on-line research activities).

The CTE's 27-page survey was designed to gather a systematic profile of the range of activities being done by teachers in order to adequately advise stakeholders (policy makers, school administrators, business and industry, and classroom teachers) on strategies currently used to integrate telecommunications technology as a learning tool and professional resource. The CTE developed its survey sample by posting on-line announcements to over 50 educational, commercial, and state-run networks; and making requests through mailing lists (e.g., FrEdMail, ISTE, K-12 Net, Learning Initiatives), conferences, state education departments, and personal contacts.

Starr and Milheim (1996) conducted an exploratory study to gather information on educators' methods and views of the Internet, and to provide baseline data on how the Internet was being used by educators. The terms education and instruction were used to search the Internet for newsgroups to participate in the study. Thirty newsgroups were selected and an announcement of the survey and request for participation was posted to each one with an email address to respond to. All transactions were electronic. Participants emailed their requests for a survey form, form were sent to back electronically, and participants completed and returned the online form by email. Some 147 completed surveys were returned to the investigators. The survey contained 16 questions, four concerning demographics and twelve on usage. Seven of the usage questions were multiple choice, four were fill-in with a narrative response, and one was open-ended question for the participant to answer in detail his or her most significant educational use of the Internet. As a courtesy, an additional question was included to provide participants an opportunity to request a copy of the results of the study.

Foster (1994; as cited in Young & Persichitte, 1997) concluded there were both advantages and disadvantages, as well as potential problems, associated with using electronic mail for data collection. The advantages consisted of:

- email provides a supplemental data source,
- scheduling and geographic location problems are eliminated,
- setting up and editing the interview form can be done easily,
- time and convenience for the respondent and researcher, and

- financial costs are minimal in comparison to traditional interviews.

The researcher should also be aware of potential problems such as (Foster, 1994):

- sampling bias and generalizability (Gopal & Newsted, 1995),
- ethics (Spielvogel and McMillan, 1996),
- confidentiality, anonymity, and loss of personal privacy (Akeroyd, 1991; as cited in Denzin & Lincoln, 1994, p. 358; Spielvogel and McMillan, 1996), and
- common courtesy or issues of net etiquette, "netiquette" (Young and Persichitte, 1997).

Email Discussion Groups

The moderator of a listserv or some other type of organized online group, functions as a coordinator or supervisor of the group's online activities and conversation (Laughon & Kurshan, 1996). The group's activities are typically designed to bring distant participants together for communication and collaborative exchanges of information. Depending on the list or project, the moderator could be a volunteer with a loosely self-defined role, or an official moderator with a structured, well-defined role. For example, Ferri (email communication, January 18, 1997) created her own listserv and served as the owner and moderator of the listserv to collect data for her doctoral research. To manage her data collection and ensure confidentiality, Ferri set up the listserv with the following criteria:

- the list was a closed, moderated list,
- only the moderator (Ferri) and participants in the study could subscribe to the list,
- all email messages for the list were routed to the moderator first and then resubmitted by the moderator to the whole list without headers, email addresses or signatures files (to ensure that the original sender could not be identified),
- participants did not have access to each other's email addresses and all discussion for the study took place through the list,
- discussion was scheduled for four days per week (Monday-Thursday), and
- participants were signed up to receive messages from the list in digest form (one large message per day).

Wizer and Beck (1996) used an email discussion group to supplement a graduate teacher education course on diversity. The results from their class activity indicated that online discussions

may:

- enable dialogue that is more open and less restrained, and
- help decrease tension when used to discuss controversial issues. (p. 6)

Wizer and Beck speculated that "online discussions allow for greater equality of participation, and afford those who are less likely to speak up in class an alternative platform to voice their opinions" (p. 11).

Wilson, Lowry, Koneman,and Osman-Jouchoux (1996) noted characteristics about email discussions that make them function differently from traditional, face-to-face conversations:

- e-mail is self-paced, and therefore gives people an opportunity to reflect on their contributions to the discussion,
- discussants can participate at any time and place that is convenient to them,
- e-mail provides automatic notes in the form of a written record of discussion and references mentioned in the discussion,
- email can be an excellent tool for people who have difficulty in expressing themselves in public settings,
- email discussants experience a delay time in responding, so the discussion may have moved on before someone has a chance to contribute,
- discussion can be disjointed and confusing because the group, responding at different time, ends up discussing several themes at once.

Electronic Interviews

In a recent study by Young and Persichitte (1997), electronic interviewing was looked at as a viable method for data collection. The interview and recording of data were simultaneous, which simplified recording the data in comparison to the traditional method of interviewing. As a result, the data analysis process was streamlined and the usual transcription process was completely circumvented. Therefore, the participants' responses were thoroughly and accurately collected and transcribed (documented).

Young and Persichitte believe the user characteristics of the study's sample population both enhanced the trustworthiness of the study and led them to "question the credibility of an electronic methodology" (p. 3). However, their sample was limited to participants that had access to a

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computer and an online service for email. They also acknowledged that although their study may have been drawn from a more diverse geographical population, it was possibly biased toward the "information rich while ignoring the information poor" (Ender, electronic mail communication, 1996; as cited in Young & Persichitte, 1997, p. 3).

Web-Based Surveys

In order to assess how the WWW was being accessed and use by educators, Brauch, Gerhold, and Patt (1996) used a web-based survey in order to ask narrative questions of educators in a nationwide study. The education web site Web66 (http://web66.coled.umn.edu) was used to gather a listing of K-12 schools in the United States with homepages. Schools that had a "mailto" link on their homepages for email contact were selected to participate. The same electronic letter was sent to each school representative contacted. Over 800 educators from 35 states covering all geographical areas of the United States were emailed. The participants were directed to respond to an online survey posted on the WWW. The survey addressed issues such as school access, teacher training, teacher use, student use, projects, frequency of use and problems. From the responses received, the authors were able to determine some of the prevalent uses of the WWW by educators, some of the difficulties that develop as a result of using the WWW in K-12 schools, and that a majority of the people creating school homepages were teachers who were using the web in their classrooms.

Tilney (1997) created a web-based survey (http://garnet.berkeley.edu:4046) and posted an appeal in a professional journal for teachers to visit her updated online survey, "Do you use computers to teach writing in school?" (p. 60). She explained that the preliminary version of her online survey had not been crafted well enough to elicit the type of data she needed. Tilney made some changes in the design of the survey, expanded it, and now hoped that the responses she receives will contribute to a meaningful analysis of the data.

Software Tools

Researchers at the Education Development Center/Center for Children and Technology have been developing a software system to transform a computer network into a self-documenting research tool (Spielvogel and McMillan, 1996). The Footprints project has developed a system to track what applications are used on a computer, how they are being used, and for how long. The

software presents a user with questions to capture his or her thinking before, during, and/or after the use of an application. The information generated in the system is stored in a centralized database which can store a large quantity of information. Individual sites around the world can be set up to participate in any particular study. The data is immediately available for researcher to analyze and report.

To ensure confidentiality and/or anonymity for an individual or group (e.g., school or organization) with this type of research tool, the Footprints software was designed with a feature to have the user actively choose (select) to participate in a project's data collection. The user has to acknowledge and agree to have his or her responses reported as data, or the tracking feature of the software will not function without the user's knowledge and consent. Spielvogel and McMillan point out that users' privacy and other ethical issues must always be considered.

Rick Watson, a professor at the University of Georgia in the Department of Management (Terry College of Business), has developed software that can be used with electronic focus groups to analyze responses. The software, WebQ (http://www.cba.uga.edu/management/rwatson/qsort/) is a web based version of a Q-sort, a part of the Q-method. Dr. Watson's software is a JavaScript routine which can be easily modify as needed. WebQ provides the researcher a manageable solution for Q-sorting over the web, and has several advantages over paper-based Q-sorting:

- lower cost,
- less preparation time for the researcher,
- the results of the q-sort are mailed to the research, and
- validation of the respondent's q-sort. (Watson, 1997)

Issues of Concern

Researchers using electronic mail as a method of data collection should be concerned about a variety of potential problems including difficulties related to establishing rapport with respondents along with the encouragement and interpretation of emotion or meaning based on nonverbal cues (Young and Persichitte, 1997). However, it is likely that interview relationships may be more easily established with electronic mail since the users of email often exhibit characteristics of encouragement and ease of rapport to each other.

Although sampling bias is an important issue for researchers to consider when conducting

any data collection through electronic mail, the possibility of including subjects previously inaccessible may make this technique more appropriate for certain research projects. In this way, sampling opportunity may compensate to some degree for sampling bias (Young and Persichitte, 1997).

Conclusion

There are distinct advantages and disadvantages to using email survey research over traditional paper questionnaires and interview formats (Thach, 1995). For researchers who are planning to conduct research using electronic mail interviews, Young and Persichitte (1997) present a set of practical and informative guidelines to consider:

- become an ethnographer - study the culture of electronic mail and learn net etiquette or "netiquette" before you begin your research, and be prepared to communicate these cultural standards to participants as needed;
- select your research sample carefully using specific criteria to clearly define the sample to compensate for bias;
- establish guidelines "a priori" with the participants regarding time between communications, whether any other type of communication may occur (e.g., traditional mail - "snail mail", telephone calls), full disclosure that they are participating in a research study and any ethical issues associated with the study, and other issues related to using interview protocols;
- establish a rapport by "chatting" with participants prior to the actual interviewing to help establish the standardized electronic mail response patterns for both the participant and researcher;
- check for messages from participants regularly;
- limit the length of messages to participants to just a few questions at a time;
- responses to participants should be timely, especially when clarifications, illustrations, explanations, and elaborations are needed;
- use and encourage participants to use acronyms and symbols that communicate feelings, emotions, etc.;
- to demonstrate understanding and concern for careful and accurate representation, and clarifying any misinterpretation, summarize a participant's responses to interview questions

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and send the summary back to him or her for verification of your understanding of the participant's message;

- be alert for misunderstandings, be aware of changes in the tone of responses, unusual response lag, symbols that inconsistent with previous email messages, and any other clues which might concern you to question the credibility of a response;
- be prepared to refocus the discussion of the interview topic(s) when a participant is communicating about a topic(s) beyond the scope of the interview topic(s);
- encourage participants to forward relevant artifacts such as email messages from colleagues or messages posted to other discussion groups or listservs, minutes or logs from meetings.

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Appendix

Part 2 - Describe a draft of the approach of how you will use the Internet in your investigation of the changing role of school library media specialists in the light of new technologies.

The Purpose of the Study

The purpose of my study will be to describe and understand how school library media specialists in k-12 schools, specifically in Georgia, view the changing professional role of school library media specialists because of the integration of new technologies into the schools and school library media program. Research and theory related to the nature of educational change will possibly be used as a theoretical framework for the study.

The overall intent of my research is not to generalize but to provide information and insights related to the specific implementation of and effects of the technology infused into Georgia schools because of lottery funding from the state, and how it has effected the school library media program and the role of the school library media specialist.

Assumptions of the study (based on Craver, 1994, p. xv -xx):

1) The study assumes that the majority of school library media centers in Georgia are in a transitional phase with regard to utilizing many of the technologies currently available. For example, some media centers may already have access to the World Wide Web through a commercial provider like America Online, some may have access to on-line catalogs with locally mounted CD-ROM databases, or some may have just started to automate their library system. Current and new technologies include: hypermedia and multimedia, hypertext, interactive media / video, artificial intelligence, voice-activated technologies, CD-ROM systems, electronic networks, advanced telecommunications, fiber optic cabling, distance learning, instructional television services, access to remote library collections,

2) The instructional role of the SLMS will change dramatically with presence of advanced technologies.

- SLMSs will become instructional technologists responsible for teaching faculty and students how to use and access on-line databases, interactive media, distance learning, and sophisticated software systems. Their instructional technologist role will extend into the community, where parents will be able to access the media center's on-site and remote collections from modems at home and work. SLMSs will also have to concentrate and develop evaluative instruments that demonstrate student achievement and learning in an on-line environment. While other

performance measures such as circulation and acquisitions statistics will be useful, evaluation of instruction with new information technologies will be emphasized.

- Installation of electronic technologies will require that SLMSs become managers of reference and information services. This new role will entail developing modern access protocols; updating, maintaining, and troubleshooting networks and databases; and simplifying access to complex software systems. Managing the collection will also involve new responsibilities because its definition, nature, and composition will change with expanded access to remote library collections and in-house CD-ROM databases.

3) SLMSs will face other major changes and challenges within several broad categories:

- acquiring and promoting new information technologies
- developing a performance-based model of programs and services
- creating a collection that reflects cultural, societal, and employment changes
- providing instructional programs and services that are competitive and reflective of student and faculty needs
- integrating symbolic-analytic skills into resource-based learning units
- organizing and managing school media centers to meet the changing social and informational needs of students and faculty

Reference:

Craver, K. W. (1994). School library media centers on the 21st century: Changes and challenges. Westport, CT: Greenwood Press.

Tentative Research Questions for the study:

- how has the role of the school library media specialist changed because of technology?
- what types of interactions have evolved between teachers and the school library media specialist because of the implementation and usage of technology?
- what challenges have been encountered with the implementation of technology into the school library media program?
- what are the major forces for change confronting SLMS in Georgia?

Methodology

The purpose, focus, and boundaries will be determined a priori, but the actual research design will

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remain flexible in order to accommodate and take advantage of the knowledge gained and opportunities suggested during field work. Within the framework of a naturalistic paradigm, a combination of qualitative and quantitative approaches will be used:

- informal and formal interviews (including electronic interviewing)
- observations / site visits to schools to observe SLMS
- field notes
- focus group discussion (online)
- public and personal records, reports, and documentation
- web-based questionnaire and survey

Tentative Timeline for Data Collection (pending approval of prospectus):

- Tentative start date August 1997
- Tentative stop date December 1997

Preliminary Goals:

1. Post message to listservs for prospective online participants in the study (June-July 1997):

    [*I am already subscribed to these lists.]

    The Georgia Library Media Specialist Listserv - state
    Georgia Media Specialists listserv <media@fiddle.rome.ga.us>
    The Georgia Media Specialists listserv is maintained at the Northwest Georgia RESA, Rome.
    Human Administrator: "O. P. Cooper" <opcooper@gadoe.gac.peachnet.edu>

    School Library Media Specialist Listserv (LM-NET) - national and international
    Human Administrator: Peter Milbury <pmilbury@ERICIR.SYR.EDU>

    School Library Media Specialist List (SLMS-LIST) - regional/national
    Site: State University of New York at Buffalo
    Computerized administrator: listserv@listserv.acsu.buffalo.edu
    Human administrator: slms-list-request@listserv.acsu.buffalo.edu

2. Design and create a web-based survey.

    *Use preliminary version for feedback to guide any revisions for the actual data collection form to be used on the web.

3. Obtain committee and IRB approval for research

*Complete prospectus; obtain approval.

*Complete and submit IRB forms.

*Contact and seek approval from school systems, if necessary.

4.. Contact prospective in-state participants:

*Use membership directories for Georgia Library Media Association (GLMA) and Georgia Association for Instructional Technology (GAIT) for addresses (email and snail mail)., telephone and FAX numbers

*Visit the Georgia State Dept. of Education website for further contact information.

Description of Subjects

- School Library Media Specialists - building level
- System Library Media Coordinators - district level

Possible participants for the study (Personal Contacts):

(Rural)	(Suburban)	(Rural/Suburban)
Barrow County:	**Clarke County**	**Douglas County:**
1 elem. SLMS	1 middle SLMS	1 middle SLMS
	1 HS SLMS	1 elem SLMS
	1 SLM Coordinator	1 SLM Coordinator

(Urban)	(Urban)
Atlanta City Schools	**Decatur City Schools**
1 elem SLMS	1 HS SLMS
1 middle SLMS	
1 SLM Coordinator	

Technology and Learning: A Reaction Paper

Comprehensive Examination Question

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Table of Contents

I. Introduction 1

II. Reactions to Perkins and "Knowledge as Design" 2

- What is understanding?
- The Knowledge As Design Approach
- Connecting Knowledge
- Learning In Context and Learning Environments

III. Reactions to Papert and "The Children's Machine" 8

- Learning and Teaching Styles
- Brain-Based Learning
- Resource-Based Learning
- Semantic Webbing
- Creativity and Learning

IV. Conclusion 14

- Why Should Technology Be Used in Education?

V. References 19

Introduction

When I was a special education teacher of severely handicapped students, I used a strategy called "concept teaching" to help my students to grasp and understand the lessons or skills being introduced to them. For instance, if I was working on expressive language - communication skills and I wanted a student to recognize an object ("what is this?") and identify the object verbally ("what do we call this?"), then I used a variety of materials that represented that object – pictures, drawings, icons, the object itself in different sizes, shapes, colors, textures - whatever could be identified as that object. My students would be encouraged to touch and manipulate the object to experience what it was and what it could do. Once I had a student say to me, "milk – white water." She was telling me she had made a connection that showed she understood something about color and texture: milk was like water, it was "wet" and you could drink it like water, but it was "white". No one else might see this event as significant, but for me it convinced me that this strategy worked and I should keep using it.

Another significant thing happened to me while I was a special education teacher, I learned how to use a computer. In 1985, I was fortunate enough to be working in a school system that had computers, had them in labs and in many classrooms, and allowed teachers to check them out and take them home! My classroom was on the same floor with some business education classes and I became friends with those teachers. One of the teachers, Alva Hartry, introduced me to word processing using a program called AppleWriter. I borrowed a student textbook, checked out an Apple IIe computer one weekend, and taught myself how to use the program. I was excited about how I could use the computer to keep track of my paper work – IEP (individualized educational plan) goals and objectives, staffing notes, student data sheets, and progress reports. Alva later showed me another program, AppleWorks, that could do so much more than AppleWriter. AppleWorks was my first experience with an integrated software package. I learned to use all of its many features including databases and spreadsheets. I was forever hooked on computers. Since 1985, I have taught myself how to use computers, taken staff development and college courses, returned to graduate school full-time (twice!) to learn more about the uses of computer technology in education, and finally changed the focus of my career from teaching in special education and working with just a few students each year to becoming a school library media specialist and working with an entire community of learners.

Technology has definitely had a strong influence in my work and personal interests as a teacher and student.

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"The Children's Machine" (Papert, 1993) made me think about my introduction to computers and how much I enjoyed learning how to use those old Apple II computers. I wasn't forced to do it, or told how to do it, but allowed to explore and experience different things that I could do with a computer. Even though I don't like labels, Papert's description of "yearners" and "schoolers" made me think about why some people in education seem to accept new ideas and approaches with ease or enthusiasm, while others seem perfectly content with how things are and prefer it that way. I am a yearner, this I am sure of, and it's a label I do like.

In "Knowledge As Design" (Perkins, 1986), the principal theme of the book, using the concept of design as a tool for problem-solving and understanding knowledge, was sensible and inspiring to me for two reasons:

- it provided me a rationale for the "concept teaching" strategy I used as a teacher, and
- it gave me a practical explanation for why I prefer to have lots of examples and hands-on activities as a student, and as a teacher!

From my assigned readings and other sources I found, I noticed Papert and Perkins both discuss and write about similar themes related to children, school, learning, creativity, critical thinking, learning by doing, computers and technology. Their metaphors for learning, "knowing your way around" (Perkins, 1986, p. vi) and "bricolage" (Papert, p. 131), were similar to me because they both refer to the notion that you work and learn by finding your way with what you have - your "tools" - your knowledge.

In this paper, I highlight a few of the issues that Papert and Perkins discuss which I had a strong reaction to from either a practitioner's (teacher/school library media specialist) perspective or from a learner's (doctoral student) perspective. I provide brief discussions and examples of how various concepts and strategies are being implemented in schools or classrooms by teachers and students. I conclude with a brief rationale and discussion about why technology should be used in education.

Reactions to Perkins and "Knowledge as Design"

"To me the purpose of education is to make you more effective in life, and life doesn't come packaged in disciplines. In real life, you're not always in the same room with an expert who knows the right answer. The best way to educate is to start where people are... if the learner is interested in rap music, you start with rap music. What we know about real-world situations, authentic phenomena, is that they contain all the disciplines swirled around within them. An effective teacher can involve students from many different disciplinary perspectives by beginning with something that learner is interested in, rather than some artificial problem... So what people are mastering in work is the ability to make decisions given

> *incomplete information, inconsistent objectives, and uncertain consequences. And that's what we need to be teaching in education – not so much what we know and how we know it, but what to do when you don't know something, and how to act when you don't know exactly how to get to where you want to be."*
> *- Chris Dede* (O'Neil, 1995, p. 9)

What is understanding?

When a student knows something, the student should be able to articulate it or demonstrate it in some way (Perkins and Blythe, 1994). Understanding actually goes beyond knowing and is more subtle. Perkins and Blythe propose a "performance perspective" to explain understanding as a matter of being able to do a variety of "thought demanding" things such as explain a topic, find evidence and examples of the topic, generalize, apply, analogize, and represent the topic in a new way (p. 6). In order to understand something, a student needs to spend time on tasks that ask him or her to generalize, find models or examples, carry out applications or conduct experiments, and perform activities to demonstrate understanding.

Typically, students are introduced to or exposed to a subject in some way, taught some facts about it, learn certain basic procedures, and that's about it (Perkins, 1996). Generally, students are given few opportunities in school to apply what they are learning to a real life situation in a way that demonstrates their understanding of the information or subject.

Students need to be able to use knowledge, and not just know about things. Understanding comes from making connections among and between things, from deep knowledge not surface knowledge, and from greater complexity not simplicity (Perrone, 1994). Teachers can engage students in more thoughtful subject-matter learning by drawing connections between the students' lives and the subject matter, between principles and practice, and by teaching for understanding (Perkins and Blythe, 1994). For example:

- a science teacher asks her high school students to prepare a multimedia presentation to explain their position on an international environmental protection treaty to be signed by the President – students will evaluate and apply different scientific viewpoints based on their research about the topic of global warming
- a mathematics teacher asks his class to design the floor plan of a local community center including a place for the band and the dance floor – students will use the information and skills they've studied in geometry.
- a literature teacher asks her students to reflect on and write about their own growing-up process –

students will be reading a novel that focuses on the main character's development from childhood to adulthood. (p. 4)

The Knowledge As Design Approach

Perkins (1986) encourages students and teachers to be authors or designers of knowledge. He asks four questions which provide a framework for understanding or a guide for connected knowledge:

1. What is its purpose (or purposes)?
2. What is its structure?
3. What are model cases of it?
4. What are arguments that explain and evaluate it? (p. 5)

The knowledge as design approach is concerned with the authentic and comprehensive use of knowledge we acquire throughout our learning. The approach tells you, "don't just learn the facts as data; learn the facts as you learn to reason with them" (Perkins, 1986, p. 29). However, in schools the metaphor for learning is often one of knowledge transmission rather than of knowledge construction (Lehrer, Erickson, Connell, 1994). Some typical assumptions underlying the common metaphors for instruction are:

- the classroom metaphor - typical time and place definitions suggest that instruction is what goes on in classrooms during 50-minute intervals, emphasizing teacher-centered and teacher-led instruction;
- the product delivery metaphor - suggests an information-processing and transmission model of instruction – instruction is exported and delivered;
- systems and process metaphors - definitions of instruction tend to emphasize inputs and outputs, steps or stages, interlocking mechanisms, self-correcting feedback and maintenance, and control of flow. (Wilson, 1996, 1995)

Lehrer, Erickson,and Connell (1994) used Perkins' knowledge as design approach in a another way to refer to the mental processes and activities involved in the development of "technologically-based knowledge artifacts", such as students and teachers collaborating to design tools that structure information like a Logo tutorial program or a hypermedia document (p. 228). In their descriptive study of twenty 9th grade students in an American history class, the authors discovered that:

- high levels of student effort and involvement were apparent,
- students developed a number of valuable skills, such as finding and interpreting information, articulating and communicating knowledge, and using computers as cognitive tools,

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- students used the hypermedia authoring environment to create rather complex documents about American history, and
- students were able to see knowledge in a different way because of their own constructive efforts. (p. 248)

The research results appeared to suggest that in a variety of contexts students participating in the design activities seemed to explore their topics more deeply, talked and collaborated with each other about the topics, developed personal interests and involvement in the topics, and began to develop critical standards for knowledge.

Connecting Knowledge

> *"Hands-on teaching methods start with a concrete example which gets to the abstract more quickly... You're teaching the same thing but just differently. Circumstances help us understand what's happening. As a Chinese proverb says, 'Tell me and I'll forget. Show me and I may remember. Involve me and I'll understand.' " – Larry Rosenstock (Vo, 1997b, p. 16)*

To build knowledge requires planning, access to resources, availability of materials, and communication. Technologies as tools extend and amplify human functionality (Jonassen, 1995). For example, a student's productivity is enhanced when applications like word processing, spreadsheets, and desktop publishing are viewed and used as tools . Knowledge representation tools like databases, semantic networks, expert systems, computer conferencing, multimedia and hypermedia expand a student's thinking process because they facilitate knowledge construction and connect critical thinking skills in a variety of subjects.

Fred Carrington, a physics teacher at Grant High School (Van Nuys, California) acknowledges that many students may be learning subjects without knowing how they might use the knowledge in careers, and that teachers often do not make the connection between classroom learning and what students will eventually do in the world of work (Vo, 1997b). Carrington believes the idea of using vocational studies as a context for academic subjects makes sense. Carrington explains:

> "If you're a carpenter, you do have to know engineering... I do the projects I do so students can work with their hands and their minds... One of the projects we do is to make a camera. The idea is for the students to do their own research on how to do it. I show them the principle of optics behind it, and they have to take apart a camera and see how it is made. They learn to become more inventive and more creative." (p. 14-15)

Hampik Dekermenjian, a former student of Carrington who is now a civil engineer,

remembered how the physics teacher used lots of visual aids and "toys" to teach physics: "... nothing was abstract. He had so many examples of things to play with." (Vo, 1997b, p. 13). And, as Laura Salerno explains it, "first you get a visual grasp of the concept and then you get the formula." (p. 17).

Salerno, also a student of Carrington, described how she was able to take what she learned in his class and apply it to a real life problem - "why do you add salt to water when you cook pasta?" (Vo, 1997b, p. 15). Salerno and another student created a science fair project about food (pasta) based on information they learned in class about kinetic energy and chemical bonds. From their research they discovered that water is polarized and salt is ionized, and when cooking pasta adding salt to the water creates a bond which makes the water hotter and cooks the pasta faster.

At the Chicago High School for the Agricultural Sciences (Chicago Ag) students apply their academic knowledge in many ways, even in elective classes such as agribusiness and horticulture science (Vo, 1997a). Chemistry lessons about ions and reactions help students when they examine soil samples to determine soil composition. In biology class, students learn about life cycles and plant tissues to understand how plants grow and why they acquire diseases. The students maintain and take care of plots at the school's land laboratory, the farm, to learn how to identify different plants, study their anatomies, experiment with cultivation methods, and control weed growth. Students have access to more than 100 Power Macs and IBM-compatible computers found through out the school in classrooms, labs and the school library media center. Chicago Ag's faculty are continuously planning more sophisticated hands-on experiments, lessons that use high-tech labs and incorporate using the Internet.

Despite years of limited resources and facilities, the school only recently acquired a 150,000-square foot addition with other amenities to accommodate the learning and teaching needs of students and staff. The strength and reputation of Chicago Ag has come from its high academic expectations, and its ability to make agricultural studies relate to urban life and job opportunities for its students. The curriculum provides students with a strong foundation in analytical skills and prepares them for educational opportunities well beyond high school, and for professional careers in fields such as agronomy, biochemistry, genetics, environmental conservation, engineering, farm appraisal, land surveying, rural sociology, and college teaching.

Learning In Context and Learning Environments

Perkins reflects on our childhood familiarity with our local neighborhood, and compares this to

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a learning environment (1996; as cited in Wilson, 1995, p. 27). As you grew up in your neighborhood, you knew your way around – where to go, where to find things, who to ask, and what to expect. Knowing your way around anything certainly means knowing what it is and knowing how to do it, but it also depends on having a sense of orientation, recognizing problems and opportunities, perceiving how things work together, and possessing a feel for the texture and structure of whatever it is (Perkins, 1996).

Perkins' idea of "knowing your way around" expands the scope of what knowing is or what it means – that is, learning in the context of a natural setting. However, his idea doesn't seem to be readily applied to most classrooms and textbooks (1996, p. vi). A limited view of knowledge that includes only "knowing that" and "knowing how" is usually not enough for most kinds of learning we aspire to. Knowing your way around seems very similar to the concept of a learning environment - tacit and explicit knowledge, focal and peripheral awareness, a sense of what's there, what's interesting, and what's valuable. The concept of a learning environment looks at settings that "calculatedly support and stimulate the learner, making ideas accessible, avenues apparent, mysteries inviting, and problems approachable" (Perkins, 1996, p vii).

In a learning environment, people can draw upon resources to make sense out of things and construct meaningful solutions to problems (Wilson, 1996). At a minimum a learning environment contains:

- learners
- a place or setting where the learner acts using tools and devices, collecting and interpreting information, and interacting with others. (Wilson, 1995, p. 26)

The "traditional" or typical classroom could be a considered a "lean or minimalist learning environment" with relatively few tools for manipulating and observing content, making learner exploration and problem solving difficult (Wilson, 1996, p. 6-7). "Rich learning environments" contain more materials for inquiry, manipulation, and place more control of the environment in the hands of the learners themselves. Students are typically engaged in multiple activities with the teacher serving as a coach and facilitator. Rich learning environments could more easily be called "constructivist" learning environments because of the emphasis on the importance of meaningful, authentic tasks. A constructivist learning environment can be defined as "a place where learners may work together and support each other as they use a variety of tools and information resources in their guided pursuit of

learning goals and problem-solving activities" (p.5). Wilson (1995) reiterates Perkins' idea of learning in context:

> Approaching instruction as a constructivist learning environment is an attempt to preserve the richness and complexity that draws people into a subject in the first place, while providing tools and supports to "learn our way around". (p. 28)

Reactions to Papert and "The Children's Machine"

"...Large numbers of teachers manage to create within the walls of their own classrooms oases of learning profoundly at odds with the education philosophy publicly espoused by their administrators..." (Papert, 1993, p.3)

Despite what current research tells us about learning and teaching, many K-12 schools do not function as, or have the vision of, a learning community. The traditional institution of "school" does not view teachers in a creative role but as technicians doing a technical job (Papert, 1993). Teaching is considered more of a technical art with knowledge imparted into "teachable bites so that they can be fed to the students one at a time by a teacher, and this leads straight into the traditional paraphernalia of curriculum, hierarchy, and control" (p. 63). Learning is occurs through a series of technical acts by the teacher who is placed in the role of a technician.

Papert talks about "Schoolers" and "Yearners" and how these two different viewpoints coexist in our present educational system. The Schooler clings to traditional roles and procedures, and views change as something that occurs gradually within the school:

> ... Schoolers are locked into the assumption that School's way is the only way because they have never seen or imagined convincing alternatives in the ability to impart certain kinds of knowledge. (p. 12)

Papert describes the Yearner as someone who needs something different, wants alternatives, and is not threatened by change. Yearners may feel frustrated and constrained by many of the factors that impede change in education, like local politics, the bureaucracy of the school system, and ongoing budgetary issues. Oftentimes, the Yearners who manage to succeed within the system are moved into administrative positions (e.g., principals, directors or coordinators, superintendents) which puts them in settings where they can influence the schools' educational philosophy and policies on curriculum and teaching methods. Yearners are typically the educators that help to create and establish alternative programs within the school system.

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The model of school we all know well consists of a fixed schedule (e.g., 8:00am to 3:00pm, Monday through Friday) with a fixed curriculum, weekly lesson plans, and mandatory standardized testing of all students. Kort (1996) points out that most educational institutions are designed around the teaching model. The traditional K-12 school has been designed for the convenience of the teacher and not to meet the needs of the learners. Most educators have internalized this model of teaching, Yearners and Schoolers alike, but this model also contributes to a state of tension Papert talks about. Many teachers struggle with this tension in a place where they must perform "laid-down procedures" versus the "yearnings for teaching that will help us fall in love with knowledge" (p. 60). One of Papert's main issues for change in education becomes centered around the state of tension for teachers to accept the School's way to be "technicians," or their attempt to resist that role and "bring warm, natural human relationships into their classrooms" (p. 55).

Technology has the potential to detechnicalize learning, and support megachange in education to limit or eliminate the technical nature of learning (Papert, 1993). Johnson (1996) believes there will be paradigm shifts when teachers and technologists begin to collaborate to adapt technology to the needs of educators and to help them find new tools which can help the process of teaching and learning.

What technology has to offer pedagogically will be useful as long as the possibilities and limitations of what it can do are also recognized by the teacher (King, 1996b). One of the negative things that has typically occurred with technology integration in schools has been the interference of administrators to impose their own personal preferences of what and how technology will be used in the school. Many school principals have arrogantly or naively believed that if they bought the technology for their school and had it available for teachers and students, it would be used. When technological innovations are driven by non-teachers there is often little more than "gee-whiz" fascination with the technology (King, 1996a). If technology is to be focused on desired outcomes, it must be controlled and directed by teachers who are directly responsible for producing those outcomes. Teachers can and should make these decisions, but they must be supported in developing teaching strategies and implementing hardware configurations that best suit them.

Papert (1993) talks about another source for tension within school, the hierarchical system of control the School has for students, teachers, and administrators. School limits the degree of personal initiative for each person, and everyone must follow the plan. But in reality, are people really accepting these limits? It seems to me that there are many teachers, students, and administrators who

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have the vision and courage to see around the restrictions and traditions of School in one way or another to focus on individual needs, learning styles, and creating schools which model true learning environments.

Learning and Teaching Styles

Papert (1993) believes we all "build up a stock of intuitive, emphatic, commonsense knowledge about learning" (p. 27). For example, a student may be able to understand something about a learning situation without knowing the entire skill or lesson, or a teacher uses this type of knowledge as the basis for an instructional decision about her third period class.

Vandergrift (1994) points out that for educators to recognize the differences in learning and teaching styles means they must acknowledge the individual differences among learners. In fact, students are generally identified, labeled and grouped according to certain quantifiable characteristics (e.g., age, grade level, test scores). In spite of all that is known about the varieties and importance of learning styles, many teachers continue to present subject-matter content as if there were only one right way to learn it. Individualized learning is often thought of in terms of the student pacing himself or herself through a prescribed set of learning activities with the option of doing more of the same activity, or engaging in some other predetermined activity when the assignment is completed. Too often teachers plan instruction for students according to their age, grade level, IQ or test scores, as if these variables were the most important and the only true indicators of learning behavior. There are other variables that are just as important and should be considered. For instance:

- does the student learn more easily working alone, with a peer, with a teacher, or interacting in a group?
- does the student learn better inductively or deductively?
- does the student prefer instruction delivered through tactile, audio, printed, or other visual means, or through multi-media productions?
- does the student prefer more abstract or concrete learning experiences?
- does the student prefer instruction in discrete bits or through integrated experiences?
- does the student seem to learn in the same way for every subject or subject-matter content? (Vandergrift, 1994, p. 13)

There are many differences in the ways students construct and negotiate meaning, and discovering which way works best for each individual student, or a using combination of instructional

approaches, should be a primary goal in education: "learning how to learn is the most necessary survival skill in today's society" (Vandergrift, 1990a, 1990b; as cited in Vandergrift, 1994). Rather than expecting all students to adapt their learning to a particular teaching style, teachers must become knowledgeable and comfortable with many more approaches or models of teaching to better serve students with different abilities, interests, and learning styles to stimulate educational growth and excite them about learning (Vandergrift, 1994). The key thing to keep in mind is that there is no one right or best way to teach any particular content (p. 28).

When the vision and culture of a school is focused on student learning the expectation for students is that they will take responsibility for their own learning and will construct meaning based on previous experiences and new information (Stripling, 1997). Teachers support and encourage students to look for explanations, make assumptions, generate ideas, and consult a variety of resources to answer questions and make their learning more meaningful. When a school cultivates an environment of free exploration and inquiry, learning and teaching both change:

- students are expected to pursue intellectual questions independently, rather than be handed the answers through lectures and textbooks,
- assessment of learning changes from rote test-taking to creation of more authentic products,
- the school culture changes into a learning community with everyone sharing in the responsibility for student learning, and
- opportunities for collaborative planning and teaching between teachers and school librarians increase. (p.89)

Teachers and school library media specialists can be the catalyst in building a school's learning community to support and motivate students as they construct meanings, develop concepts and strategies for lifelong learning.

Brain-Based Learning:

Too often schools are planned as if students were information processing devices rather than thinking and feeling active meaning-makers. Research on the human brain supports the premise that meaning-making is an innate activity of human beings, who continually extract patterns from the babel of confusing stimuli in their environments (Caine & Caine, 1991; cited in Vandergrift, 1994, p. 12). This research encourages teachers to think of students as naturally motivated, active learners who need complex real-life learning experiences rather than simplified step-by-step means to an end. The teacher

then is someone who respects students' abilities and creates a rich classroom environment in which those students may select authentic, ongoing projects that will enable them to expand their mental capabilities. Cooperative ventures in a supportive learning environment provide opportunities for students to make meaningful personal connections. An integrated thematic approach to content fosters this natural acquisition of knowledge and leads to a sense of accomplishment in young learners. (Hill & Hill, 1990; Slavin, 1991; as cited in Vandergrift, 1994, p 12)

Resource-Based Learning

According to the literature on multicultural learning studies, there are differences in learning styles among different ethnic and cultural groups in the United States. For example, the research found that:

- African Americans and Greek Americans tended to learn alone;
- Cree Indians and African Americans tended to be visual learners;
- Greek Americans and western European Americans tended to be auditory learners;
- Mexican Americans, Chinese Americans, and European Americans tended to have stronger peer orientation (Bracy, 1990; as cited in Mendrinos, 1994, p. 3)

Resource-based learning and multimedia technology offer an alternative learning environment to students of diverse learning styles in way that pure textbook environments fail to address.

Resource-based learning is adaptable to individual, group, and cooperative learning activities. Students are encouraged to provide feedback to each other which develops social knowledge along with logical knowledge (Mendrinos, 1994). Cooperative learning between two or three students has been shown to increase self-worth, self-esteem, and self-actualization (p. 12). Resource-based learning also facilitates the development of and discrimination among multiple literacies:

- auditory literacy - the ability to hear (listen) and discern, analyze, and evaluate the message;
- visual literacy - the ability to view (see) images and discern, analyze and evaluate the message;
- textual literacy - the ability to read and write;
- information literacy - the critical thinking process used to seek, gather, evaluate, and apply information in all formats, to look beneath the surface of the visual, auditory and textual, to problem-solve and identify possible solutions. (Mendrinos, 1994, p. 3)

Semantic Webbing

Semantic webbing is another alternative approach to help students organize their ideas, see

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relationships, and develop a topic for research (Freedman & Reynolds, 1980; Kulleseid, 1986; as cited in Vandergrift, 1994, p. 51). For instance, a group of students might begin brainstorming on the topic of rap music by placing all topics or questions related to rap music, at the center of a web. As information or ideas related to rap music are generated from the students, the information gets depicted as strands of the web drawn out from that central focus. Additional information, supporting evidence, or subsets are repeatedly related and drawn on the web, and the students are encouraged to explore relationships among all the elements listed on the web.

Creativity and Learning:

"To invent, you need a good imagination and a pile of junk." (Thomas Edison)

When an artist begins to paint, her fascination with colors and shapes draws her deeply into the work. A mathematician's fascination with a problem and a relevant theory motivates her to search for a solution to the problem. Tischler (1997) asks the question of how can a teacher impart to a learner the same type of enthusiasm and drive for teaching and learning, the way an artist and mathematician feel for their work. He feels teachers should do all they can to instill the joy of learning to students, and he gives four suggestions:

- use students' curiosity about the whole (the system) to stimulate their interest in the parts – teach the complex first, then simple to complex. For example, once students become interested in how the human body operates (its systems), then the teacher can focus more on the different parts of the body. After the parts of the body have become more fully understood, the teacher can return to teaching about the whole and discussing specific parts, diseases, treatments, etc.
- use relevant material that focuses on the "here and now" – associating and relating an activity with what is going on in students' daily lives. For example, if the lesson is about the heart, let students listen to their own heartbeats or check each other's pulse rate.
- allow students to have fun – strict rules often hinder the learning process, especially when it interferes with good will and laughter. For example, fun and light-hearted activities can support the daily lesson on studying different blood types by using simulated samples for students to test for blood type, DNA pattern and Rh factor.
- allow for hands-on learning – "learning by doing". Hands-on activities create interest and are appropriate for all types of learning. For example, let students disassemble and reassemble a bike or the motor of a car, so they can see how the parts of the object function as a whole. When students

are given opportunities to perform what a task using their new knowledge, they will associate it, relate it, internalize it, and remember it. (p. 66)

Creativity can have order and at the same time be chaotic. Our personality, interests and knowledge come together for "our early undifferentiated masses of information, playing around and thinking" (Stanley, 1994, p. 61). Different personalities will focus on different things in different proportions and time frames – chaos or order, vagueness or a plan, discipline or play. Some people prefer the directness of sequential steps, others prefer being uncertain and unguided in the beginning and then focusing their work later.

Stanley (1994), a professional artist and art instructor, believes that doing things in sequential steps, both works and doesn't work. Following steps can be too limiting, and at the same time, the steps provide a general list of the goals to be achieved. Step-following and imagination complement each other, and together, they make up creativity. Imagination is a process of the mind while creativity is imagination focused and fully realized, a process of the hands (p. 57).

Very often, when a student finds it hard to come up with a new idea, she will begin to think she is not creative. Most people don't realize how much time and effort it takes to work up something new and different. Just because someone finds it difficult to be creative doesn't mean that they are not creative. There are many ways to create and many ways to achieve it.

Creative ideas will often emerge when several things are happening at once. Even at the early stage of a non-linear approach to creating something, several steps can begin simultaneously to work towards a final goal. For example, to create an instructional unit on designing a web page you could explore techniques, select materials, design lessons, and create a template of a web page. Absorption is an essential ingredient of the creative process. Sometimes aimless, sometimes focused on specific needs, soaking up of materials enriches the mind in mysterious ways. Good cooks, mechanics, artists, dancers, musicians and teachers, all had to spend a long time in the learning curve before effective "spontaneity" emerged (Stanley, p. 58).

Conclusion

Why Should Technology Be Used in Education?

A summary of the research on educational technology conducted from 1990-1995 indicated that:

- introducing technology into the learning environment has been shown to make learning more

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student-centered, to encourage cooperative learning, and to stimulate increased student/teacher interaction;

- positive changes in the learning environment brought about by technology are more evolutionary than revolutionary, and the changes occur over a period of years as teachers become more experienced with technology;
- courses for which computer-based networks were used increased student-student and student-teacher interaction, increased student-teacher interaction with lower-performing students, and motivated many students to be active participants in online class discussions. (Bialo & Sivin-Kachala, 1996, p. 33)

There are some key components that must be in place for technology to be used by teachers:

- appropriate technology must be available,
- support is needed for teachers to help them use the technology,
- it takes time and practice to integrate technology into the instructional program, and
- administrators and fellow teachers need to support innovation. (Knapp & Glenn, 1996, p. 21)

Teachers should be able to use computer-related technologies as integrated parts of their daily activities. As teachers have time to gain experience, they find technology facilitates their new roles as coaches and guides of students, and allows for accommodation of a wider variety of learning styles and activities in the classroom (Wright, 1993).

Computer-related technology is often introduced with great expectations as to what it will be able to do in schools for students and teachers – reduce teacher work loads and make them more efficient managers, provide new and exciting instruction to students (Wright, 1993). When working with computer-related technology, teachers are often surprised when things work better than what they had expected, or when they unexpectedly find out how to do something, or when they experience something altogether unpleasant because what was expected didn't occur at all, like software crashes, hardware malfunctions, no technical support, or other teachers' resistance to using the technology. If computer-related technologies are to be used effectively in schools, teachers must know what resources exist, must have some examples of how to use those resources, must have time to experiment and develop their own confidence in using these resources and tools in their teaching and with their students.

Jonassen (1995) believes the most productive and meaningful uses of technology engage

students in knowledge construction, conversation, articulation, collaboration, and reflection. His vision for integrating and implementing technologies into schools stresses supporting seven qualities of meaningful learning:

- active - students immersed in the process of learning and taking responsibility for their own learning;
- constructive - students adapt or fit new ideas into their prior knowledge in order to make sense or meaning of a query;
- collaborative - students work together cooperatively, modeling and observing each other, and providing support and feedback to each other;
- intentional - students work purposefully to achieve a goal (cognitive objective);
- conversational - knowledge is enhanced by socialization in and out of school;
- contextualized - learning tasks are situated in meaningful real-world tasks or simulated in case-base or problem-based learning environments; and
- reflective - students describe what they have learned and reflect on the process. (p.60-61)

Technology should be used to support the student and the learning environment, and as context and cognitive tools in order to effect the most significant changes in learning.

For example, when students are about to learn a new process, such as writing a news story, teachers should model the entire process, from doing interviews and collecting factual information, to writing paragraphs in an appropriate style (Knapp & Glenn, 1996). Sometimes it does make sense to introduce new skills and processes to the whole class in a teacher-led lesson. But, a large-screen projection system and a computer can be an extremely effective teaching tool in this situation too. The computer and projection system function as an "electronic chalkboard," and the teacher can demonstrate how to write a news story by entering students' suggestions and guiding the story's language and development as the students watch and contribute. At the end of such a lesson, the teacher can print and duplicate copies of the story to provide students with a realistic model of a news story they can refer to when writing their own.

Cartwright (1993) offers a reason for the use of computers in instruction - their tremendous power, speed, and access to a wide variety of information. Also, they allow students and teachers to be interactive users which permits them to modify, experiment with, and customize information. Technologies used in classrooms in the near future will have characteristics that are dynamic and

interactive, and will require the student to interact directly with the media in real time and modify the media to achieve instructional goals and objectives.

Whitaker (1996) points out that in a middle school technology can effectively link traditional subjects for curriculum integration and exploration. Interdisciplinary activities are integrated through word processing, databases, and spreadsheets which allow students to generate, publish, and share their work. When teachers become confident and convinced that computers offer significant advantages to the learning environment, they will begin to implement computer-supported activities in the classroom and find ways to include the technology into other curriculum areas (Knapp & Glenn, 1996).

Hall (1996), an 8th grade science teacher, discussed how she increased her use of technology in her classroom and changed her methods of instruction to allow her students more access to technology. Hall's students became active researchers and users of new technologies as they worked in small cooperative groups while rotating through different technology workstations. Depending on what resources were available, students could work on a computer simulation package, view a video or computer slide show, search databases or visit sites on the World Wide Web. Hall also learned how to use many kinds of technology with her classroom computer, including interactive computer programs, videodiscs, and CD-ROMs. She emphasized that technology is a valuable resource and tool that should be accessible and available to all students and teachers.

For computers to be truly effective in helping students learn to think analytically and solve complex problems, the computer tools (e.g., databases, simulations, animation and graphics) need to be available when students are engaged in the processes, not for a class period a day or once a week (Knapp & Glenn, 1996). When computers are used on a daily basis, the research shows that computers do help students learn to be more competent writers, researchers, and problem-solvers. When students use computers occasionally, they experience more effective practice environments for learning basic skills, and also benefit from the teacher's use of technology for demonstration purposes. But if students use computers only occasionally, they will not be empowered to adopt the computer as a personal tool that is as fully integrated into their lives as other technology tools like telephones, calculators, VCRs, and televisions (p. 32).

Technology is changing the way we work, where we live, how we communicate, and how we learn (Spindler, 1995). In education, technology is making us look at instructional philosophy from a new perspective, one based on collaborating, synthesizing communication and information. Education

is moving beyond its traditional boundaries to extend its resources to a larger community. Schools, homes, colleges, museums, businesses, and professional groups are beginning to share their resources, more and more. In today's classrooms, we see the shift towards a school without walls where learning occurs anywhere, anytime, any place: "...the genesis of communities of learners, connected to each other, sharing resources and collaborating in brand new ways"(p. 6).

As it relates to adult education and distance learning, Hopey and Ginsburg (1996) ask the question "what will learning look like when it is not bound by four walls and the knowledge base of one teacher?" (p. 23). Certainly, the question is also appropriate for K-12 education. The six assumptions Hopey and Ginsburg suggest can be applied to how technology will effect teaching and learning in the future for K-12 education as well:

1. Traditional classroom-based models of instruction will be enhanced not replaced by the new technologies.
2. Self-authoring of learning activities will be commonplace.
3. Teachers will become facilitators of learning not transmitters of knowledge.
4. The future of learning will be about connecting learning to the world of work and home.
5. Collaborative learning will be stressed.
6. Staff development and teacher training will need to be continuous and ongoing. (p. 23)

Students must be encouraged to be enthusiastic, lifelong learners who are not afraid to tackle the unknown. Teachers must learn to change their attitudes, get comfortable with technology, and learn to accommodate change. The computer, and any related technologies, will make it possible for many new and exciting things to happen for teaching and learning in the future (Bork,1996).

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Focus on Selected Roles of School Library Media Specialists:

Information Professionals and Educators

Comprehensive Examination Question

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Table of Contents

I. Introduction 1

II. The Role of the School Library Media Specialist (SLMS) 1

- Traditional view of the role of SLMS
- The influence of technology
- Information access, storage, and dissemination
- Evaluating and using emerging information technologies
- Promoting information literacy
- Resource-based learning
- Promoting computer literacy

III. Special Skills and Attributes of the Instructional Planning Process 7

- Resources
- Learner needs

IV. Teaching, Student Learning and Achievement 9

- How the SLMS is involved in teaching
- Student achievement and satisfaction with their learning
- Learning and the school library media program:

V. Collaboration with Teachers 12

- Promoting collaborative planning
- Collaborative teaching and evaluating
- The significance of providing instruction to students by the SLMS

VI. Conclusion 13

VII. References 15

Introduction

One of the goals of our educational system is to prepare students for the dramatic and pervasive changes that will certainly occur in the near future, such as distance learning, virtual classrooms, and televideo conferencing (Droegemueller, 1994). Futurists foresee the integration of the home, school, and workplace, with jobs, responsibilities, and activities blending into each other to form new contexts and settings. If our purpose is to prepare students to live, learn, and work in the future, then there are some questions that must be examined:

- how can we learn about different cultures and how to interact with other people,
- how can we be creative and productive in our work, and
- how will the school, home, community, and workplace be integrated into lifelong learning? (p. 10)

The school library media program as we currently know it to be has evolved to reflect a multidisciplinary educational focus (Hopkins & Butler, 1991). This focus recognizes the instructional, informational, and recreational needs of students, and that students learn at different rates and in different ways. The profession today recognizes the integral role of the library media program in education and the complementary roles of the library media specialist as an information specialist, instructional consultant, and teacher.

The Role of the School Library Media Specialist (SLMS)

> *Schools with active media specialists and media departments are at distinct advantage (Charp, 1994b).*

Traditional view of the role of SLMS

School libraries and librarians have changed as dramatically as information itself (Toronto Access to Resources Gathered for Education by Teacher-Librarians, 1996). Traditionally, the school librarian had the responsibility for evaluating and selecting all library/media materials and equipment for the school, and providing limited resources and services on demand (Marchionini, 1991; Toronto Access to Resources Gathered for Education by Teacher-Librarians, 1996). From time to time, teachers would seek help from the school librarian for generating bibliographies on specific topics, gathering books and materials, and preparing lessons on research projects. But, the school librarian had very little direct involvement in curricular development. Now, the school librarian, known as a teacher-librarian or school library media specialist, is a professional librarian and certified teacher with specialized training in education, librarianship, and instructional technology.

School library media specialists possess a wide variety of skills, knowledge, and competencies which qualifies them to administer and manage library media programs in K-12 schools (Simmons College, 1997). These skills and competencies include:

- knowledge of child and youth development,
- expertise in curriculum and instructional design,
- evaluation and selection of learning materials,
- the ability to access electronic databases and collections outside the school,
- understanding and having the ability to use technology in strengthening the teaching/learning process,
- stimulating the reading habit through contagious enthusiasm for reading,
- stimulating teacher interest in increasing students' use of library media technology resources,
- knowledge of public relations,
- demonstrating effective communication techniques with teachers, administrators, and students, and
- management skills and leadership in staff development.

The influence of technology

> *Just as the book and library were the foundation of our modern schools, the new telecommunications technologies will be essential to learning and teaching in the future. (MacDonald, 1994).*

Change is and will be a constant characteristic of education (Wright, 1993). A major challenge will be the ongoing management of information and new technologies, which will rapidly introduce new equipment, new processes, new methods, new relationships, and new work assignments into schools. Presently, education is already shifting its focus to (Charp, 1994a):

- planning education by skill rather than by job,
- instructional modules rather than courses,
- automated courseware development via expert systems,
- embedded and continuous testing and measurement rather than explicit testing,
- multisensory instructional/learning modules to accommodate various learning styles,
- network access to worldwide libraries,
- distributed education with learner control, and
- student-initiated educational experiences (p. 8)

Similarly, school library media specialists recognize that the focus (mission) of library media programs must emphasize (Stripling, 1996):

- fostering a community of learners,
- emphasizing thinking and inquiry skills,
- teaching through coaching,
- providing in-depth learning experiences,
- making students accountable for their learning,
- encouraging authentic assessment, and
- providing a safe learning environment (p. 1)

However, many classroom teachers are neither trained or experienced enough to feel very comfortable with all these changes. Teachers are having to make many more instructional decisions, be accountable for them, and do this without much of a knowledge base on which to draw for approaches and techniques (Hartzell, 1994). Teachers are often put into the position of finding what they need to know and learning it own their own time. Teachers need help and support, and the most "likely source to help them get that in-school training and technical assistance becomes the school library media specialist" (p. 152-153).

The integration of technology into the curriculum continues to increase as both more and better hardware and software becomes available to schools (Charp, 1994b). Teachers look for appropriate software to satisfy their curriculum objectives. Materials in demand are the ones that promote problem solving and higher-order thinking skills, group participation, and combine disciplines to integrate curricula. Many teachers are beginning to develop their own instructional materials using popular authoring tools like AuthorWare, HyperCard, and HyperStudio.

Means and Olson's (1993; as cited in Knapp & Glenn, 1996) review of the literature indicated that technology:

- often stimulates teachers to present more complex tasks and material,
- tends to support teachers in becoming coaches rather than dispensers of knowledge,
- provides a safe context for teachers to become learners again and to share their ideas about curriculum and method,
- can motivate students to attempt harder tasks and to take more care in crafting their work,
- adds significance and cultural value to school tasks. (p. 14)

Information access, storage, and dissemination

> *The school library media specialist will be the advocate for user rights of access and user responsibility of network use (Marchionini, 1991).*

As a professional engaged in life-long continuing education, all formats of information access and searching fall within the expertise of the school library media specialist (Kafai & Bates, 1997). The concept of what types of resources are available in the school library media program has changed from the focus of print-dominated materials to a concept that recognizes the importance of informational sources and instructional materials being available in a variety of formats (Hopkins & Butler, 1991). But, the strength and value of a school's library media program is determined by the quality, diversity, and effective management of available resources and information to its primary users, specifically, students and teachers (Charp, 1995).

The American Library Association (ALA, 1996) advocates for school library media specialists to assume leadership roles in promoting the principles of intellectual freedom within schools by providing resources and services that create and sustain an atmosphere that supports and leads to free inquiry by students. The school library media program should provide a collection of resources that are free, accessible to all students, appropriate to the developmental and maturity levels of students, supports the curriculum and is consistent with the philosophy, goals, and objectives of the school, and representative of diverse points of view (e.g., personal, social, political, religious).

School library media specialists work closely with teachers to integrate instructional activities into classroom units designed to equip students to locate, evaluate, and use a broad range of ideas effectively (American Library Association, 1996). But, there are barriers from time to time between students and the resources available in the school library media center, such as:

- charging fees for information in specific formats (e.g. photocopies),
- limited use of interlibrary loan services,
- restricted access to electronic information,
- requiring parental or teacher permission to access materials, and
- various other restrictions including age, grade level, and subject content; restricted areas or shelving, closed collections, and the labeling of materials. (American Library Association, 1996)

Evaluating and using emerging information technologies

Typically, school library media specialists have the expertise in and knowledge of new media and

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technological advances which enables them a have a professional understanding and sensitivity to help students and teachers with issues and problems associated with technology (Vandergrift, 1994). As a group, library media specialists are often more committed to technology than other educators, and are often better able to help others see not only the possibilities of technology, but the limitations as well. Vandergrift stresses that school library media specialists should be the leaders to advocate the use of technology in schools for the things that it can uniquely do, but also be the voices that express caution about embracing any technological invention as an end in itself with expectations beyond the capabilities of what it can actually do for the process of teaching and learning.

For example, all around the world teachers and school library media specialists are exploring the uses of the Internet (Gray, 1994). Kinch (1997), an Australian teacher-librarian, saw her role as being a link to reliable information sources and helping students and staff access the Internet as an information source. She describes how she prepared to integrate using the Internet as a part of the learning program at her school:

> ... realizing that the ISC was to be the hub of the Internet network and that I had a key part to play in implementing it effectively, I made developing my skills and liaising with the IT support a priority. As soon as I felt confident in my new skills, I began "marketing" the Internet as part of the learning program to the teachers and principal.

Promoting information literacy

The American Association of School Librarians (AASL, 1995) believes the building-level library media specialist has a critical role in a school's instructional program and promotes information literacy by:

- working with classroom teachers as a co-teacher in planning, designing, delivery and evaluation of instruction using a variety of resources and information problem-solving skills,
- providing leadership, expertise and advocacy in the use of technology and resources,
- team teaching with classroom teachers to enable students to become active, life-long learners, and
- providing students instruction, guidance and practice in the use of information for problem-solving and personal enrichment.

The integration of the school's curriculum and the school library media program is central to helping students master information literacy skills (American Association of School Librarians, 1995). Loertscher (1996b) describes the information literate student as "an avid reader, a critical thinker, a creative thinker, an interested learner, an organized investigator, an effective communicator, a responsible

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information user, and a skilled user of technology tools" (p. 192). Information literacy involves the abilities to (Rakes, 1996):

- know when there is a need for information,
- identify information needed to address a given problem or issue,
- locate the needed information,
- evaluate the information,
- organize the information, and
- use the information effectively to address the problem or issue. (p. 52)

To provide students with the best chance of being successful lifelong learners, students need to become information literate and skilled in using computer-based tools to deliver information (Rakes, 1996). One way to achieve the goal of information literacy is through the use of resource-based learning strategies. Resource-based learning involves examining a topic and locating the information necessary to answer questions or to solve problems related to the topic. Learning resources can include a variety of media from print to non-print, to computer-based resources.

Wright (1993) asserts that teaching students traditional ways of locating information and using information must be supplemented by a better understanding of the information search process in an environment where multiple electronic databases of information are available. The effectiveness of information-skills instruction in schools will:

> ... in part, depend on the ability of the school library media specialist to select appropriate computer-related information resources, to develop instructional strategies that build not only on the software's capability but also on the current capabilities of students, and to design with teachers instructional strategies that make the best use of these electronic resources in light of the curriculum and the goals of the school. (p. 11-12)

Resource-based learning

Resource-based learning and multimedia technology open the door to students of diverse learning styles in ways that a purely textbook environment fails to address (Mendrinos, 1994). Resource-based learning offers an alternative learning environment to the classroom that promotes information literacy and requires library media specialists to be fully involved in the educational program, concerned about student achievement, and proactive in their relations with faculty and administration. The school library media specialist and teacher become facilitators or guides in the learning process. The student becomes an active

participant in his or her learning, using available resources to problem solve and find answers to questions.

Resource-based learning is adaptable to individual, group, and cooperative learning activities. Students are encouraged to provide feedback to each other which develops social knowledge along with logical knowledge. Cooperative learning between two or three students has been shown to increase self-worth, self-esteem, and self-actualization (Mendrinos, p. 12). Resource-based learning also facilitates the development of and discrimination among multiple literacies:

- auditory literacy - the ability to hear (listen) and discern, analyze, and evaluate the message;
- visual literacy - the ability to view (see) images and discern, analyze and evaluate the message;
- textual literacy - the ability to read and write;
- information literacy - the critical thinking process used to seek, gather, evaluate, and apply information in all formats, to look beneath the surface of the visual, auditory and textual, to problem-solve and identify possible solutions. (p. 3)

Promoting computer literacy

The increased use of computers in library media programs has contributed to the label of computer or technology expert for school library media specialists among classroom teachers (Mohn, 1992). Teachers typically look at school library media specialists for help with integrating technology into their classrooms, and for leadership in implementing computer literacy into the curriculum.

Johnson and Eisenberg (1986) also believe school library media specialists should provide leadership and knowledge in the area of computer literacy. Most of the general public and educators agree that our students need to be proficient users of computers, that they need to be computer literate. However, in many schools computers are still being used as electronic flashcards and worksheets. The computer is not necessarily utilized as a productivity tool in curriculum content areas. Although, many vocational education courses, like those in technology and business education, do include computer productivity skills as a part of their curriculum., these skills would be beneficial to all students. School library media specialists should be advocates for computer integration into the content areas, and help teachers and administrators recognize that computer literacy skills should not be taught in isolation but in an integrated approach with information literacy skills to help students learn in more meaningful ways. Individual computer skills take on purposeful meaning when they are integrated within the information problem-solving process, and students develop practical skills because they have applied various computer skills as a part of the learning process.

Special Skills and Attributes of the Instructional Planning Process

Finding his or her way in the ever-expanding world of information, the student needs an interpreter, instructor, and consultant, as well as an expert informational gatherer (Craver, 1994). Loertscher (1996a) believes school library media specialists have the special skills that prepare them for the roles of :

- materials expert,
- collaborator to help build solid learning experiences,
- professional literature expert (what does the current research tell us?),
- information detective, and
- youth advocate. (p. 72)

With the emphasis on learning materials in formats appropriate for all subjects and levels of ability, school library media specialists have acquired a greater role in instruction. Within their instructional roles they help faculty determine the appropriateness of resources for instructional objectives, and aid in the design and production of resources (Hopkins & Butler, 1991).

Resources

> *Currently, more information is being stored digitally rather than in print. The familiar paper-based library card catalog stored in wooden and metal cabinets has changed into an online database format accessible from the classroom, home, or another country (Gray, 1994).*

Any new developments and emerging technologies such as computer assisted instruction (CAI), integrated learning systems, multimedia and hypermedia, networking and satellite technology, the Internet and World Wide Web are finding their way into school library media centers (Castor, 1994; Gray, 1994). Present and future school library media programs will have collections that include a wide variety of multiple media in many formats from computers, CD-ROM workstations, video equipment, telecommunications equipment, books, and periodicals to online databases and software that complement the school curriculum (Marchionini, 1991; Veccia, 1997).

A technology-rich environment offers students the opportunity to become active participants in the learning process (Charp, 1994b). Many school library media programs have the resources and facilities to be something like a "high-tech laboratory" that allow students to communicate their work via word processors, databases, spreadsheets, audio, video, digital photography, multimedia presentations, and web pages (Loertscher, 1996b). Students who have these types of opportunities to express their ideas in more than just a written report are more creative, think more deeply about their ideas, and are more excited

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about sharing what they know (p. 194).

Droeggemueller (1994) asserts that technology will be the main ingredient that connects the school, workplace, and home. Technologically connecting schools to the global community will make current and future learning relevant and useful. Learning will have no boundaries, as students can connect with other people to access and share information, ideas, and experiences from within their local community, across their home state, and around the world.

Learner needs

The International Association of School Librarianship's (1993) description of the function of the school library media program is to provide a wide range of resources, print and non-print, including electronic media and access to data which promotes an awareness of the student's own cultural heritage, and provides the basis for an understanding of the diversity of other cultures. The school library media program nurtures various student needs: personal, cultural, recreational, informational and educational (informal and structured learning). Mathews, Flum, and Whitney (1990) identify the following:

- the belief in a worthwhile future and understanding of their responsibility and contribution to that future,
- a positive sense of self-worth,
- the ability to locate and use information and the awareness that this ability is an essential key to self-realization in the Information Age,
- preparation to use present-day technology and to adapt to a changing technological world,
- equal access to all information resources and opportunities to use a variety of information technologies that store, transmit, and retrieve information,
- the ability to think critically in order to problem solve and make informed decisions,
- the ability to communicate effectively by listening, speaking, writing, and reading,
- preparation to live in a multicultural world and to respect the rights and dignity of all people,
- the ability and desire to become lifelong learners, and
- a broader view of the world through imagination and creative ability. (p. 169-170)

Teaching, Student Learning and Achievement

Schools seeking to provide the type of education and training needed for the future are involving students in more interdisciplinary projects that call for collaboration over extended periods of time and the

development of products that demonstrate their knowledge (e.g., student portfolios). Teachers are beginning to do more coaching than lecturing, spending larger blocks of time (e.g., 90 to 120 minutes for a class period) working with individual students or groups of students in information-rich learning environments (Craver, 1994; Mendrinos, 1994; Vandergrift, 1994)

How the SLMS is involved in teaching

> *"... I see my role as that of a facilitator ... as working with the teachers as a team member to afford kids lots of opportunities for expanded learning. I'm a team teacher instead of just an isolated teacher who is teaching things that I hope will branch out...", an elementary school library media specialist (Shannon, 1996, p. 162).*

When the use of computers becomes more thoroughly integrated into classrooms, their presence will force many teachers to reevaluate their teaching styles and methods. The technology will lead the way for newer educational strategies such as resource-based teaching, collaboration, and on-line instruction. All of the educational changes driven by technology will require a greater need for the school library media center and the services of a certified school library media specialist. (Sizer, 1992; Perelman, 1992; as cited in Craver, 1994, p. xiv)

Miller (1991) acknowledges that currently not every school library media center functions as a learning laboratory, a foundation for resource-based education, or as a demonstration site for technology. But, she contends that the survival of school library media specialists as viable members of the instructional system in schools depends on their developing programs and services that become learning intensive. The school library media program that moves into the mainstream of the instructional program will focus on knowledge of how students learn and the development of teaching partnerships with classroom teachers. The applications of technology for student learning and the management of systems are increasingly becoming a natural part of the school library media program.

The current restructuring movements in schools is providing school library media specialists with opportunities in at least three ways to increase their influence with teachers (Hartzell, 1994):

- site-based management (also, participative management, total quality management, and other teacher empowering movements) presents opportunities, challenges, and problems never before encountered,
- curriculum decision-making and curriculum innovations (e.g., multiculturalism, outcome-based education, mastery learning, interdisciplinary studies, magnet schools, and emerging technologies), and
- the structure of the school day is changing and consequently, is changing how teachers teach (e.g., year-round school, block scheduling, team teaching) and reshaping the dynamics of the classroom. (p 152)

Student achievement and satisfaction with their learning:

> *Current research suggests a strong relationship between the availability of school library media resources and student achievement (Simmons College, 1997).*

School library media programs have a valuable and positive impact on student learning, and contribute to the overall performance goals of schools and school districts (Berkowitz, 1993). There is empirical research to support a positive correlation between the level of library media center service available and student scholastic achievement (Haycock, 1993). For example, the research indicates:

1) In schools with a full-time library media specialist, and library media facilities and resources:
   - students perform significantly better on tests for basic research skills, including locational skills, outlining and notetaking,
   - students perform significantly better in reading comprehension and in effectively expressing their ideas about what they read,
   - students enjoyed reading,
   - students read more, and
   - students developed more positive self-concepts.
2) There was a positive correlation between student academic achievement and:
   - the size of the library media center staff,
   - the size of the library media collection, and
   - school library media center expenditures (budget). (p. 228)

Learning and School Library Media Program

School library media specialists who collaborate with teachers spend a great deal of time and effort supporting resource-based teaching and learning (Loertscher, 1996b). When students are exposed to a variety of resources beyond textbooks, their learning experiences deepen and become more meaningful. Resource-based learning and high technology foster a nondirective teaching style in which the student controls learning within the framework of the curriculum (Mendrinos, 1994). Knowledge and pedagogy are no longer linear, and the concept of learning becomes activity based and fluid. The student "internalizes, assimilates, and accommodates these learning experiences within the cognitive structures of his mind, creating changes in attitude and knowledge" (p. 12). School library media programs can facilitate all types of learning because:

> ... we have the opportunity to nurture the creative spirit in the exploration of what quality means

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> for each student. Libraries have "mind altering potential" as youth rubs shoulders with the best ideas and intellects of all time. It is our task to expose them to the best in literature and the arts. It is our opportunity to develop the most important learning and thinking skills that they can have to deal with the processes of the future. One hopes that schools will keep pace with the changes in methodology, content and technology so that these skills can be regularly honed to meet the new challenges. (International Association of School Librarianship, 1996)

Collaboration with Teachers

> *Cooperative planning and collaborative partnerships between teachers and school library media specialists can develop students' learning experiences directly relating to the goals and objectives of the curriculum and facilitating thinking process of reflection, abstraction, and creativity. (Mendrinos, 1994, p. 11)*

Promoting collaborative planning:

Developing partnerships between teachers and school library media specialists can have a far reaching impact on a school's instructional program. At Miami Springs Elementary School (Dade County, Florida), the principal hires substitutes for two days every other month to allow teachers and the media specialist time to meet and plan in two-hour segments for each grade level (Morris, 1996). As a result of collaborative planning, the instruction is more research-oriented and less textbook-oriented. The subject content is integrated with available resources from the school's library media center and outside the school. Miami Springs' principal believes that "collaborative planning has made an impact on test scores in our school; we've seen an upward trend since implementing collaborative planning" (p. 5).

Turner (1996) points out that the role of instructional design consultant for school library media specialists has been around for at least three decades. He summarized the factors that influence the degree to which this role is assumed by a school library media specialist as:

- the principal's perception of the school library media specialist's role and the availability of time for cooperation,
- the attitudes and expectations of teachers, and
- the school library media specialist's own role perception. (p. 208)

Turner concludes that the single most important component for a successful collaborative relationship between teachers and the school library media specialist is good communication.

Collaborative teaching and evaluating:

Teachers want materials that will spark student interest, model concepts, enhance learning,

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reinforce issues, supplement curriculum, and encourage critical viewing (Charp, 1994b). Increasingly, school library media specialists and teachers are collaborating in designing, implementing and evaluating material to integrate technology in the curriculum. Teachers are interested and willing to integrate technology in their teaching strategies, provided they are given sufficient materials, support, and time. School library media specialists can provide the missing link between classroom teachers and the technical support they need (Kafai & Bates, 1997).

Aronson (1996) explains that when school library media specialists work together with classroom teachers in order to improve teaching and learning, each one contributes his or her own ideas, skills and expertise. When the school library media specialist and classroom teacher function as a team, with clear objectives and shared goals, there is a shared sense of responsibility for the mutual partnership of improving instruction which results in better outcomes for all students (p. 2).

Vecchia (1997) makes the point that it doesn't matter if the learning context is resource-based, discovery-based or something else, it just makes good sense for teachers and school library media specialists to find ways to combine their skills so that students benefit the most. Teachers and school library media specialists can grow and learn together while setting a good example for students on how to problem solve and work as a team.

The significance of providing instruction to students by the SLMS

The instructional role of school library media specialists provides invaluable opportunities for illustrating and discussing with students the critical thinking skills they need so much practice with and competency in for an information society (Marchionini, 1991). Students and teachers are provided instruction in the use of library media resources, how to access information in a variety of formats, and how to develop strategies for seeking, evaluating, filtering and applying information.. The strategies students are taught to utilize to access and analyze information are extremely important to the learning process.

Conclusion

> *Educational and technological changes, however, are combining to close the chapter of the single teacher, textbook, classroom approach to learning. (Craver, 1995)*

The redesign of our present educational system must shift its focus to what students need to know and must be able to do when they leave formal schooling (Lovejoy, 1996). The focus should be on content not on courses, on knowledge and competencies learned for the value it adds to the skill of becoming a life-

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long learner. Education must change to include applied and contextual teaching for all subjects.

School library media specialists must begin constructing a new vision of their role and the function of school libraries. They must challenge and change the old paradigm that defines the mission of school library media program as the warehouse of resources that may or may not be needed by teachers and students, teaching library skills unrelated to curriculum content, and functioning as a clerk who does little more than check materials in and out (Stripling, 1997).

The world students will face upon leaving school will be dominated by on-line information services and communication tools, and computing technologies as yet unknown (Kinch, 1997). In the future, school library media programs will be technologically rich, complex learning environments that support teaching and learning with quality information resources and services. School library media specialists will manage change through the skills they already demonstrate today: flexibility, lifelong learning, and tolerance (Marchionini, 1991). Their duties and responsibilities for managing a growing library media collection, as well as collaborating with teachers, instructing students, and providing other administrative tasks will continue. The school library media specialist, now and in the future, will be the individual who (Loertscher, 1995):

- promotes the love of reading;
- stands as an advocate for children and young adults
- promotes learning through materials and technology
- inspires excellence
- provides the best learning tools
- joins teachers in the creation of exciting learning experiences, and
- guides individual students as they venture into the world of information and technology. (p. 90)

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